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ART UNIT	PAPER NUMBER
2155	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/583,177	JAIN ET AL.	
	Examiner	Art Unit	
	Christian La Forgia	2155	

-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 April 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-59* is/are pending in the application.

4a) Of the above claim(s) *1-26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-26* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 May 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1 to 13, drawn to a method for computer to computer data routing based on least weight routing, classified in class 709, subclass 241.

II. Claims 14 to 26, drawn to a method for controlling data flow using a measurement of the average flow rate, classified in class 370, subclass 234.

III. Claims 27 to 59, drawn to a system for controlling data flow using a measurement of the average flow rate, classified in class 370, subclass 234.

2. Inventions I and II and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions have different modes of operation.

3. Inventions II and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process can be practiced by another materially different apparatus.

4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II and III, restriction for examination purposes as indicated is proper.

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. During a telephone conversation with Sam Campbell on 6 March 2003 a provisional election was made with traverse to prosecute the invention of Group III, claims 27 through 59. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1 through 26 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

7. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

8. Claims 1 through 59 are presented for examination.

9. Claims 27 through 59 were elected by the Applicant as noted above.

10. Claims 1 through 26 are withdrawn from consideration.

Drawings

11. The informal drawings filed in this application are acceptable for examination purposes. When the application is allowed, applicant will be required to submit new formal drawings.

12. The Patent and Trademark Office no longer makes drawing changes. See 1017 O.G. 4. It is applicant's responsibility to ensure that the drawings are corrected. Corrections must be made in accordance with the instructions below.

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

1. Correction of Informalities -- 37 CFR 1.85

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136 for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

Timing of Corrections

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.185(a). Failure to take corrective action within the set (or extended) period will result in **ABANDONMENT** of the application.

Specification

13. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

14. The following title is suggested: Apparatus for Estimating Delay and Jitter Between Network Routers.

Claim Rejections - 35 USC § 112

15. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

16. The term "matrix F" in claims 31 and 44 is a relative term which renders the claim indefinite. The term "matrix F" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Although the specification defines matrix F as a matrix, the Examiner believes that it encompasses too many possibilities, such as [n x n] and [n x m] matrices.

17. The term "matrix A" in claim 37 and 50 is a relative term which renders the claim indefinite. The term "matrix A" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Although the specification defines matrix A as a matrix, the Examiner believes that it encompasses too many possibilities, such as [n x n] and [n x m] matrices.

18. Claim 53 recites the limitation "coupled to said processor." There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination, the Examiner will interpret the claim as "coupled to a processor."

Claim Rejections - 35 USC § 102

19. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

20. Claims 40 through 42 and 44 through 51 rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,754,543 to Seid, (hereinafter Seid).

21. As per claim 40, Seid teaches a computer program product encoded in computer readable media, the computer program product comprising:

22. a first set of instructions, executable on a computer system, configured to identify pairs of the network elements as being in a first set of network element pairs, wherein the computer system is coupled to a network, wherein the network comprises a plurality of network elements and each one of the network elements is coupled to at least one other of the network elements by at least one of a plurality of links (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 2, lines 49-59; column 6, line 14 to column 7, line 8; claim 1);

23. a second set of instructions, executable on the computer system, configured to generate a first matrix from the first set of network element pairs, wherein each row in the first matrix corresponds to a corresponding network element pair in the first set of network element pairs, and the first matrix comprises independent rows and non-independent rows (Figure 2; column 2, lines 49-59; column 6, line 14 to column 7, line 8; claim 1);

24. a third set of instructions, executable on the computer system, configured to form a second set of network element pairs, wherein the second set of network element pairs contains independent network element pairs in the first set of network element pairs, and each one of the independent pairs of network element corresponds to a one of the independent rows of the first matrix (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 3, lines 20-45; column 3, lines 20-45; column 7, line 18 to column 8, line 56; claim 1);

25. a fourth set of instructions, executable on the computer system, configured to measure a measured network performance metric between a first network element and a second network element of each network element pair in the second set of network element pairs (column 2, lines 49-63; column 11, lines 1-61; claim 1); and

26. a fifth set of instructions, executable on the computer system, configured to compute a computed network performance metric between a first network element and a second network element of a remaining network element pair in the first set of network element pairs using at least one of the measured network performance metrics, wherein the remaining network element pair corresponds to a non-independent row of the first matrix (column 2, lines 60-63; column 11, lines 1-61; claims 1 & 2).

27. With regards to claim 41, Seid teaches wherein the first set of network element pairs is a requirements set (column 2, lines 38-59; column 6, line 14 to column 7, line 8).

28. Regarding claim 42, Seid teaches wherein the second set of network element pairs is a measurements set (column 2, lines 60-65; column 3, lines 20-45; column 3, lines 20-45; column 7, line 18 to column 8, line 56).

29. With regards to claim 44, Seid teaches wherein the first matrix is a matrix F (column 6, lines 28-60).

30. Regarding claim 45, Seid teaches further comprising:

31. a sixth set of instructions, executable on the computer system, configured to compute a number, wherein the number is equal to a rank of the first matrix (column 7, lines 9-18);

32. a seventh set of instructions, executable on the computer system, configured to determine if a first the number of rows of the first matrix are independent (Figure 2; column 2, lines 49-59; column 6, line 14 to column 7, line 8); and

33. an eighth set of instructions, executable on the computer system, configured to re-arrange the rows of the first matrix such that the first the number of the rows of the first matrix are independent, if the first the number of the rows of the first matrix are not independent (column 7, lines 38 to column 8, line 20).

34. Regarding claim 46, Seid teaches further comprising:

35. a ninth set of instructions, executable on the computer system, configured to identify a maximal set of independent rows of the first matrix based on the number (column 6, lines 14-60).

36. Concerning claim 47, Seid teaches wherein the eighth set of instructions comprises:

37. a first sub-set of instructions, executable on the computer system, configured to re-arrange the pairs of the network elements in the first set of network element pairs such that the correspondence between each row of the first matrix and the corresponding network element pair in the first set of network element pairs is maintained (column 7, lines 38 to column 8, line 20).

38. Regarding claim 48, Seid teaches wherein the third set of instructions comprises:

39. a second sub-set of instructions, executable on the computer system, configured to copy a first the number of pairs of the network elements in the first set of network element pairs into the second set of network element pairs (column 7, lines 38 to column 8, line 20).

40. With regards to claim 49, Seid teaches wherein the fifth set of instructions comprises:

41. a first sub-set of instructions, executable on the computer system, configured to form a second matrix (column 2, lines 60-65; column 7, line 18 to column 8, line 56), wherein

each row of the second matrix corresponds to a corresponding one of the non-independent rows of the first matrix (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63), and

each row of the second matrix is such that the corresponding one of the non-independent rows of the first matrix can be expressed in terms of the independent rows using the each row of the second matrix (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63);

42. a second sub-set of instructions, executable on the computer system, configured to organize the measured network performance metrics into a vector (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63); and

43. an third sub-set of instructions, executable on the computer system, configured to compute the computed network performance metric between the first network element and the second network element of the remaining network element pair by multiplying the vector by a row of the second matrix corresponding to the remaining network element pair (column 2, lines 48-67; column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63).

44. Regarding claim 50, Seid teaches wherein the second matrix is a matrix A (column 6, lines 28-60).

45. With regards to claim 51, Seid teaches wherein the fifth set of instructions comprises:

46. a first sub-set of instructions, executable on the computer system, configured to create a vector equivalent to the non-independent row of the first matrix by combining a plurality of the independent rows of the first matrix (Figure 5; column 13, line 7 to column 14, line 52); and

47. a second-subset of instructions, executable on the computer system, configured to compute the computed network performance metric by combining a measured network performance metric of each network element pair of the second set of network element pairs corresponding to one of the plurality of the independent rows of the first matrix (Figure 5; column 13, line 7 to column 14, line 52).

Claim Rejections - 35 USC § 103

48. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

49. Claims 27 to 39, 43, and 52 through 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 6,151,324 to Belser et al., (hereinafter Belser) in view of Seid.

50. As per claim 27, Belser teaches a computer system comprising:

51. a processor (Figure 13; column 10, lines 61-65);

52. a network interface, coupled to the processor and to a network, wherein the network comprises a plurality of network elements and each one of the network elements is coupled to at least one other of the network elements by at least one of a plurality of links (Figures 12 & 13; column 10, lines 45-65);

53. computer readable medium coupled to the processor (Figure 13; column 10, lines 61-65); and

54. Belser does not teach computer code, encoded in the computer readable medium, configured to cause the processor to:

55. identify pairs of the network elements as being in a first set of network element pairs ;

56. generate a first matrix from the first set of network element pairs, wherein

each row in the first matrix corresponds to a corresponding network element pair in the first set of network element pairs, and

the first matrix comprises independent rows and non independent rows;

form a second set of network element pairs, wherein

the second set of network element pairs contains independent network element pairs in the first set of network element pairs, and

each one of the independent pairs of network element corresponds to a one of the independent rows of the first matrix;

57. measure a measured network performance metric between a first network element and a second network element of each network element pair in the second set of network element pairs; and

58. compute a computed network performance metric between a first network element and a second network element of a remaining network element pair in the first set of network element pairs using at least one of the measured network performance metrics, wherein the remaining network element pair corresponds to a non-independent row of the first matrix.

59. Seid teaches computer code, encoded in the computer readable medium, configured to cause the processor to:

60. identify pairs of the network elements as being in a first set of network element pairs (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 2, lines 49-59; column 6, line 14 to column 7, line 8; claim 1);

61. generate a first matrix from the first set of network element pairs (Figure 2; column 2, lines 49-59; column 6, line 14 to column 7, line 8; claim 1), wherein

each row in the first matrix corresponds to a corresponding network element pair in the first set of network element pairs (column 3, lines 6-19; column 6, line 14 to column 7, line 8; claim 1), and

the first matrix comprises independent rows and non independent rows (column 3, lines 6-45; column 6, line 14 to column 7, line 8; claim 1);

62. form a second set of network element pairs (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 3, lines 20-45; column 7, line 18 to column 8, line 56; claim 1), wherein

the second set of network element pairs contains independent network element pairs in the first set of network element pairs (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 2, lines 60-65; column 3, lines 20-45; column 3, lines 20-45; column 7, line 18 to column 8, line 56; claim 1), and

each one of the independent pairs of network element corresponds to a one of the independent rows of the first matrix (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 3, lines 20-45; column 3, lines 20-45; column 7, line 18 to column 8, line 56; claim 1);

63. measure a measured network performance metric between a first network element and a second network element of each network element pair in the second set of network element pairs (column 2, lines 49-63; column 11, lines 1-61; claim 1); and

64. compute a computed network performance metric between a first network element and a second network element of a remaining network element pair in the first set of network element pairs using at least one of the measured network performance metrics, wherein the remaining network element pair corresponds to a non-independent row of the first matrix (column 2, lines 60-63; column 11, lines 1-61; claims 1 & 2). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Seid with the system of Belser, because it would enable a system to manage network traffic quicker and more efficiently. It would enable this traffic management by implementing a method for handling multi-cost factors in determining the relative costs of paths within each network, thereby enabling several routing solutions depending on predetermined criterion.

65. Regarding claim 28, Belser does not teach wherein the first set of network element pairs is a requirements set.

66. Seid teaches wherein the first set of network element pairs is a requirements set (column 2, lines 38-59; column 6, line 14 to column 7, line 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the requirements set of

Seid with the system of Belser, because it would aid in determining the shortest route through a network. It would aid in determining the shortest route by applying the relative costs of paths within a network, particularly the multi-cost factors.

67. With regards to claim 29, Belser does not teach wherein the second set of network element pairs is a measurements set.

68. Seid teaches wherein the second set of network element pairs is a measurements set (column 2, lines 60-65; column 3, lines 20-45; column 3, lines 20-45; column 7, line 18 to column 8, line 56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the measurements set of Seid with the system of Belser, because it would aid in determining the shortest path through a network. It would calculate the theoretical shortest path through a network by applying some type of algorithm (i.e. Floyd's or Dijkstra's), and then in turn would be applied to the requirements set. In doing this, it would give a better determination as to the actual shortest path versus the calculated shortest path, thereby determining the optimal route.

69. Concerning claim 30, Belser teaches wherein each one of the network elements is a router (column 7, lines 5-65).

70. Regarding claim 31, Belser does not teach wherein the first matrix is a matrix F.

71. Seid teaches wherein the first matrix is a matrix F (column 6, lines 28-60). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to

combine the matrix of Seid with the system of Belser, because it would create an easier way to manage the data sets. It would enable this easier method by creating a visual display for a user to interact with, having the rows by the source and the columns the destination, thereby creating something similar to a multiplication chart to display the defined metric that the matrix was representing.

72. Regarding claim 32, Belser does not teach wherein the computer code is further configured to cause the processor to:

73. compute a number, wherein the number is equal to a rank of the first matrix;

74. determine if a first the number of rows of the first matrix are independent; and

75. if the first the number of the rows of the first matrix are not independent, re-arrange the rows of the first matrix such that the first the number of the rows of the first matrix are independent.

76. Seid teaches wherein the computer code is further configured to cause the processor to:

77. compute a number, wherein the number is equal to a rank of the first matrix (column 7, lines 9-18);

78. determine if a first the number of rows of the first matrix are independent (Figure 2; column 2, lines 49-59; column 6, line 14 to column 7, line 8); and

79. if the first the number of the rows of the first matrix are not independent, re-arrange the rows of the first matrix such that the first the number of the rows of the first matrix are independent (column 7, lines 38 to column 8, line 20). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to

that of Seid and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker.

80. Concerning claim 33, Belser does not teach wherein the computer code is further configured to cause the processor to:

81. identify a maximal set of independent rows of the first matrix based on the number.

82. Seid teaches wherein the computer code is further configured to cause the processor to:

83. identify a maximal set of independent rows of the first matrix based on the number (column 6, lines 14-60). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to that of Seid and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker, as it identifies the maximum number of possible source networking elements.

84. With regards to claim 34, Belser does not teach wherein the computer code configured to cause the processor to re-arrange the rows of the first matrix such that the first the number of the rows of the first matrix are independent, if the first the number of the rows of the first matrix are not independent, is further configured to cause the processor to:

85. re-arrange the pairs of the network elements in the first set of network element pairs such that the correspondence between each row of the first matrix and the corresponding network element pair in the first set of network element pairs is maintained.

86. Seid teaches wherein the computer code configured to cause the processor to re-arrange the rows of the first matrix such that the first the number of the rows of the first matrix are independent, if the first the number of the rows of the first matrix are not independent, is further configured to cause the processor to:

87. re-arrange the pairs of the network elements in the first set of network element pairs such that the correspondence between each row of the first matrix and the corresponding network element pair in the first set of network element pairs is maintained (column 7, lines 38 to column 8, line 20). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to that of Seid and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker, as there is a direct relation between each pair, such as source and destination based upon the number of hops between them.

88. Regarding claim 35, Belser does not teach wherein the computer code configured to cause the processor to form the second set of network element pairs is configured to cause the processor to:

89. copy a first the number of pairs of the network elements in the first set of network element pairs into the second set of network element pairs.

90. Seid teaches wherein the computer code configured to cause the processor to form the second set of network element pairs is configured to cause the processor to:

91. copy a first the number of pairs of the network elements in the first set of network element pairs into the second set of network element pairs (column 7, lines 38 to column 8, line 20). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to that of Seid and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker, as there is a direct relation between each pair, such as source and destination based upon the number of hops between them.

92. Regarding claim 36, Belser does not teach wherein the computer code configured to cause the processor to compute the computed network performance metric between the first network element and the second network element of the remaining network element pair is configured to cause the processor to:

93. form a second matrix, wherein

each row of the second matrix corresponds to a corresponding one of the non-independent rows of the first matrix, and

the each row of the second matrix is such that the corresponding one of the non-independent rows of the first matrix can be expressed in terms of the independent rows using the each row of the second matrix;

94. organize the measured network performance metrics into a vector; and

95. compute the computed network performance metric between the first network element and the second network element of the remaining network element pair by multiplying the vector by a row of the second matrix corresponding to the remaining network element pair.

96. Seid teaches wherein the computer code configured to cause the processor to compute the computed network performance metric between the first network element and the second network element of the remaining network element pair is configured to cause the processor to:

97. form a second matrix (column 2, lines 60-65; column 7, line 18 to column 8, line 56), wherein

each row of the second matrix corresponds to a corresponding one of the non-independent rows of the first matrix (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63), and

the each row of the second matrix is such that the corresponding one of the non-independent rows of the first matrix can be expressed in terms of the independent rows using the each row of the second matrix (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63);

98. organize the measured network performance metrics into a vector (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63); and

99. compute the computed network performance metric between the first network element and the second network element of the remaining network element pair by multiplying the vector by a row of the second matrix corresponding to the remaining network element pair (column 2, lines 48-67; column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Seid with the system of Belser, because it would enable a system to manage network traffic quicker and more efficiently. It would enable this traffic management by implementing a method for handling multi-cost factors in determining the relative costs of paths within each network, thereby enabling several routing solutions depending on predetermined criterion.

100. With regards to claim 37, Belser does not teach wherein the second matrix is a matrix A.

101. Seid teaches wherein the second matrix is a matrix A (column 6, lines 28-60). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the matrix of Seid with the system of Belser, because it would create an easier way to manage the data sets. It would enable this easier method by creating a visual display for a user to interact with, having the rows by the source and the columns the destination, thereby creating something similar to a multiplication chart to display the defined metric that the matrix was representing.

102. Regarding claim 38, Belser does note teach wherein the computer code configured to cause the processor to compute the computed network performance metric between the first

network element and the second network element of the remaining network element pair is further configured to configured to cause the processor to:

103. create a vector equivalent to the non-independent row of the first matrix by combining a plurality of the independent rows of the first matrix; and

104. compute the computed network performance metric by combining a measured network performance metric of each network element pair of the second set of network element pairs corresponding to one of the plurality of the independent rows of the first matrix.

105. Seid teaches wherein the computer code configured to cause the processor to compute the computed network performance metric between the first network element and the second network element of the remaining network element pair is further configured to configured to cause the processor to:

106. create a vector equivalent to the non-independent row of the first matrix by combining a plurality of the independent rows of the first matrix (Figure 5; column 13, line 7 to column 14, line 52); and

107. compute the computed network performance metric by combining a measured network performance metric of each network element pair of the second set of network element pairs corresponding to one of the plurality of the independent rows of the first matrix (Figure 5; column 13, line 7 to column 14, line 52). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the matrix of Seid with the system of Belser, because it would create an easier way to manage the data sets. It would enable this easier method by creating a visual display for a user to interact with, having the rows by the source and

the columns the destination, thereby creating something similar to a multiplication chart to display the defined metric that the matrix was representing.

108. Regarding claim 39, Belser teaches wherein each one of the network elements is a router (column 7, lines 5-65).

109. Concerning claim 43, Seid does not teach wherein each one of the network elements is a router.

110. Belser teaches wherein each one of the network elements is a router (column 7, lines 5-65). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the program product of Seid on the router of Belser, because it would enable a quicker, more efficient system for routing data. It would enable this quicker system, by performing mathematical operations to calculate the best routes through a network, thereby, inevitably, saving time and bandwidth.

111. With regards to claim 52, Seid does not teach wherein each one of the network elements is a router.

112. Belser teaches wherein each one of the network elements is a router (column 7, lines 5-65). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the program product of Seid on the router of Belser, because it would enable a quicker, more efficient system for routing data. It would enable this quicker

system, by performing mathematical operations to calculate the best routes through a network, thereby, inevitably, saving time and bandwidth.

113. As per claim 53, Belser teaches a computer system comprising:

114. a network interface, coupled to a processor and to a network, wherein the network comprises a plurality of network elements and each one of the network elements is coupled to at least one other of the network elements by at least one of a plurality of links (Figures 12 & 13; column 10, lines 45-65).

115. Belser does not teach means for identifying pairs of the network elements as being in a first set of network element pairs;

116. means for generating a first matrix from the first set of network element pairs,wherein

each row in the first matrix corresponds to a corresponding network element pair in the first set of network element pairs, and

the first matrix comprises independent rows and non-independent rows;

means for forming a second set of network element pairs, wherein

the second set of network element pairs contains independent network element pairs in the first set of network element pairs, and

each one of the independent pairs of network element corresponds to a one of the independent rows of the first matrix;

117. means for measuring a measured network performance metric between a first network element and a second network element of each network element pair in the second set of network element pairs; and

118. means for computing a computed network performance metric between a first network element and a second network element of a remaining network element pair in the first set of network element pairs using at least one of the measured network performance metrics, wherein the remaining network element pair corresponds to a non-independent row of the first matrix.

119. Seid teaches means for identifying pairs of the network elements as being in a first set of network element pairs (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 2, lines 49-59; column 6, line 14 to column 7, line 8; claim 1);

120. means for generating a first matrix from the first set of network element pairs (Figure 2; column 2, lines 49-59; column 6, line 14 to column 7, line 8; claim 1),wherein

each row in the first matrix corresponds to a corresponding network element pair in the first set of network element pairs (column 3, lines 6-19; column 6, line 14 to column 7, line 8; claim 1), and

the first matrix comprises independent rows and non-independent rows (column 3, lines 6-45; column 6, line 14 to column 7, line 8; claim 1);

121. means for forming a second set of network element pairs (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 3, lines 20-45; column 7, line 18 to column 8, line 56; claim 1), wherein

the second set of network element pairs contains independent network element pairs in the first set of network element pairs (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 2, lines 60-65; column 3, lines 20-45; column 3, lines 20-45; column 7, line 18 to column 8, line 56; claim 1), and

each one of the independent pairs of network element corresponds to a one of the independent rows of the first matrix (Figures 1, 3, 4, 5, 6a, 6b, 7 & 8; column 3, lines 20-45; column 3, lines 20-45; column 7, line 18 to column 8, line 56; claim 1);

122. means for measuring a measured network performance metric between a first network element and a second network element of each network element pair in the second set of network element pairs (column 2, lines 49-63; column 11, lines 1-61; claim 1); and

123. means for computing a computed network performance metric between a first network element and a second network element of a remaining network element pair in the first set of network element pairs using at least one of the measured network performance metrics, wherein the remaining network element pair corresponds to a non-independent row of the first matrix (column 2, lines 60-63; column 11, lines 1-61; claims 1 & 2). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Seid with the system of Belser, because it would enable a system to manage network traffic quicker and more efficiently. It would enable this traffic management by implementing a method for handling multi-cost factors in determining the relative costs of paths within each network, thereby enabling several routing solutions depending on predetermined criterion.

124. Regarding claim 54, Belser does not teach further comprising:

125. compute a number, wherein the number is equal to a rank of the first matrix;

126. means for determining if a first the number of rows of the first matrix are independent; and

127. means for re-arranging the rows of the first matrix such that the first the number of the rows of the first matrix are independent, if the first the number of the rows of the first matrix are not independent.

128. Seid teaches further comprising:

129. compute a number, wherein the number is equal to a rank of the first matrix (column 7, lines 9-18);

130. means for determining if a first the number of rows of the first matrix are independent (Figure 2; column 2, lines 49-59; column 6, line 14 to column 7, line 8); and

131. means for re-arranging the rows of the first matrix such that the first the number of the rows of the first matrix are independent, if the first the number of the rows of the first matrix are not independent (column 7, lines 38 to column 8, line 20). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to that of Seid and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker.

132. With regards to claim 55, Belser does not teach wherein the computer code is further configured to cause the processor to:

133. means for identifying a maximal set of independent rows of the first matrix based on the number.

134. Seid teaches wherein the computer code is further configured to cause the processor to:

135. means for identifying a maximal set of independent rows of the first matrix based on the number (column 6, lines 14-60). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to that of Seid and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker, as it identifies the maximum number of possible source networking elements.

136. Concerning claim 56, Belser does not teach wherein the means for re-arranging the rows of the first matrix such that the first the number of the rows of the first matrix are independent, if the first the number of the rows of the first matrix are not independent, further comprises:

137. means for re-arranging the pairs of the network elements in the first set of network element pairs such that the correspondence between each row of the first matrix and the corresponding network element pair in the first set of network element pairs is maintained.

138. Seid teaches wherein the means for re-arranging the rows of the first matrix such that the first the number of the rows of the first matrix are independent, if the first the number of the rows of the first matrix are not independent, further comprises:

139. means for re-arranging the pairs of the network elements in the first set of network element pairs such that the correspondence between each row of the first matrix and the corresponding network element pair in the first set of network element pairs is maintained (column 7, lines 38 to column 8, line 20). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to that of Seid

and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker, as there is a direct relation between each pair, such as source and destination based upon the number of hops between them.

140. Regarding claim 57, Belser does not teach wherein the means for forming the second set of network element pairs further comprises:

141. means for copying a first the number of pairs of the network elements in the first set of network element pairs into the second set of network element pairs.

142. Seid teaches wherein the means for forming the second set of network element pairs further comprises:

143. means for copying a first the number of pairs of the network elements in the first set of network element pairs into the second set of network element pairs (column 7, lines 38 to column 8, line 20). It would have been obvious to one with ordinary skill in the art at the time the invention was made to configure the processor similar to that of Seid and combine it with the system of Belser, because it would enable a quicker way to manage and manipulate the matrices. It would enable this method of manipulating matrices by rearranging them in order to make calculating the cost functions simpler and thereby the calculations performed occur quicker, as there is a direct relation between each pair, such as source and destination based upon the number of hops between them.

144. Regarding claim 58, Belser does not teach wherein the means for computing the computed network performance metric between the first network element and the second network element of the remaining network element pair further comprises:

145. means for forming a second matrix, wherein

146. each row of the second matrix corresponds to a corresponding one of the non-independent rows of the first matrix, and

147. the each row of the second matrix is such that the corresponding one of the non-independent rows of the first matrix can be expressed in terms of the independent rows using the each row of the second matrix;

148. means for organizing the measured network performance metrics into a vector; and

149. means for computing the computed network performance metric between the first network element and the second network element of the remaining network element pair by multiplying the vector by a row of the second matrix corresponding to the remaining network element pair.

150. Seid teaches wherein the means for computing the computed network performance metric between the first network element and the second network element of the remaining network element pair further comprises:

151. means for forming a second matrix (column 2, lines 60-65; column 7, line 18 to column 8, line 56), wherein

each row of the second matrix corresponds to a corresponding one of the non-independent rows of the first matrix (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63), and

the each row of the second matrix is such that the corresponding one of the non-independent rows of the first matrix can be expressed in terms of the independent rows using the each row of the second matrix (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63);

152. means for organizing the measured network performance metrics into a vector (column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63); and

153. means for computing the computed network performance metric between the first network element and the second network element of the remaining network element pair by multiplying the vector by a row of the second matrix corresponding to the remaining network element pair (column 2, lines 48-67; column 7, line 18 to column 8, line 56; column 11, lines 33 to column 12, line 63). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Seid with the system of Belser, because it would enable a system to manage network traffic quicker and more efficiently. It would enable this traffic management by implementing a method for handling multi-cost factors in determining the relative costs of paths within each network, thereby enabling several routing solutions depending on predetermined criterion.

154. Regarding claim 59, Belser does not teach wherein the means for computing the computed network performance metric between the first network element and the second network element of the remaining network element pair further comprises:

155. means for creating a vector equivalent to the non-independent row of the first matrix by combining a plurality of the independent rows of the first matrix; and

156. means for computing the computed network performance metric by combining a measured network performance metric of each network element pair of the second set of network element pairs corresponding to one of the plurality of the independent rows of the first matrix.

157. Seid teaches wherein the means for computing the computed network performance metric between the first network element and the second network element of the remaining network element pair further comprises:

158. means for creating a vector equivalent to the non-independent row of the first matrix by combining a plurality of the independent rows of the first matrix (Figure 5; column 13, line 7 to column 14, line 52); and

159. means for computing the computed network performance metric by combining a measured network performance metric of each network element pair of the second set of network element pairs corresponding to one of the plurality of the independent rows of the first matrix (Figure 5; column 13, line 7 to column 14, line 52). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the matrix of Seid with the system of Belser, because it would create an easier way to manage the data sets. It would enable this easier method by creating a visual display for a user to interact with, having the rows by the source and the columns the destination, thereby creating something similar to a multiplication chart to display the defined metric that the matrix was representing.

Conclusion

160. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

161. The following patents are cited to further show the state of the art with respect to devices used to monitor network traffic and smooth jitter, such as:

United States Patent No. 5,886,643 to Diebboll et al., which is cited to show a method and apparatus for discovering network topology.

United States Patent No. 6,363,056 to Beigi et al., which is cited to show how to monitor a network's performance.

United States Patent No. 6,115,393 to Engel et al., which is cited to show network monitoring.

United States Patent No. 5,598,532 to Liron, which is cited to show a method for optimizing networks.

162. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian La Forgia whose telephone number is (703) 305-7704. The examiner can normally be reached on Monday thru Thursday 7-5.

163. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ayaz Sheikh can be reached on (703) 305-9648. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7240 for regular communications and (703) 746-7239 for After Final communications.

164. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

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clf
March 8, 2003

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